فيزياء 1 - فرست

تم الرفع بواسطة م. معن أبو عيسى

Palestine technical University
Physics I
First Exam 2009-2010
Monday 02.11.2009

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Section No: MW 12:30 – 13:50

I. For questions from 1 to 11 chose the most correct answer and fill the letter referring to it in table 1.

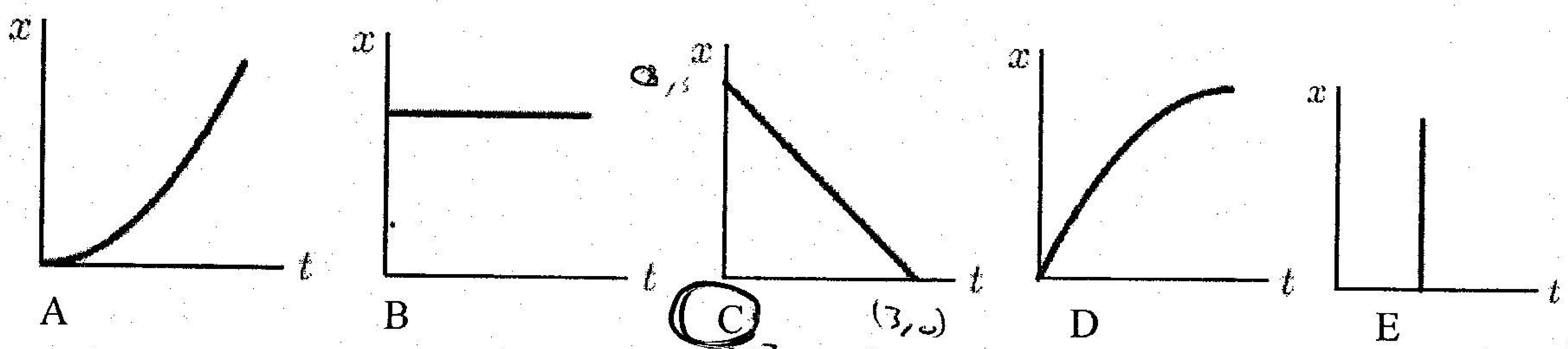
Consider g=10 m/s²

1. During a short interval of time the speed v in m/s of an automobile is given by $v = at + bt^3$, where the time t is in seconds. The units of a and b are respectively:
   A. $m \cdot s^2$; $m \cdot s^4$ B. s^3/m; s^4/m C. m/s^2; m/s^3 D. m/s^4; m/s^5 E. m/s^2; m/s^4

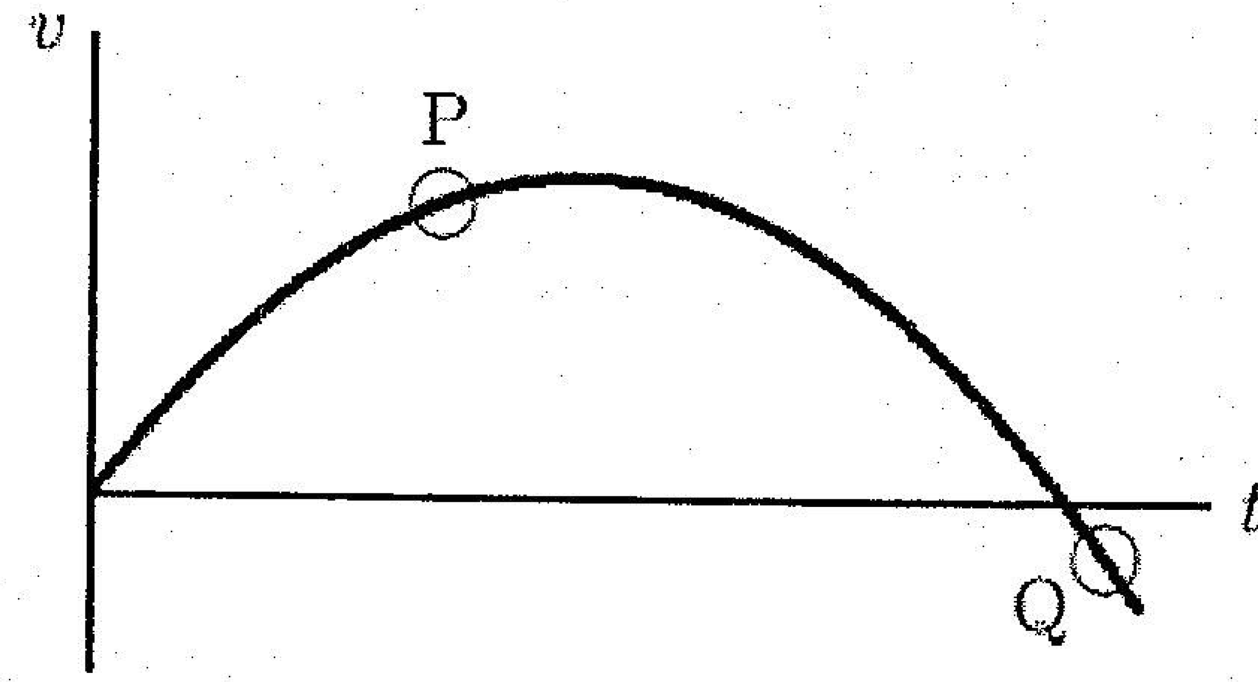
2. The coordinate of a particle in meters is given by $x(t)=16t - 2.0t^3$, where the time t is in seconds. The particle is momentarily at rest at t =
   A. 0.75 s B. 1.3s C. 5.3s D. 1.6s E. 9.3s

3. A baseball is thrown vertically into the air. The acceleration of the ball at its highest point is:
   A. zero B. g,up C. g,down D. 2g,down E. 2g,up

4. Which of the following five coordinate versus time graphs represents the motion of an object moving with a constant nonzero speed?

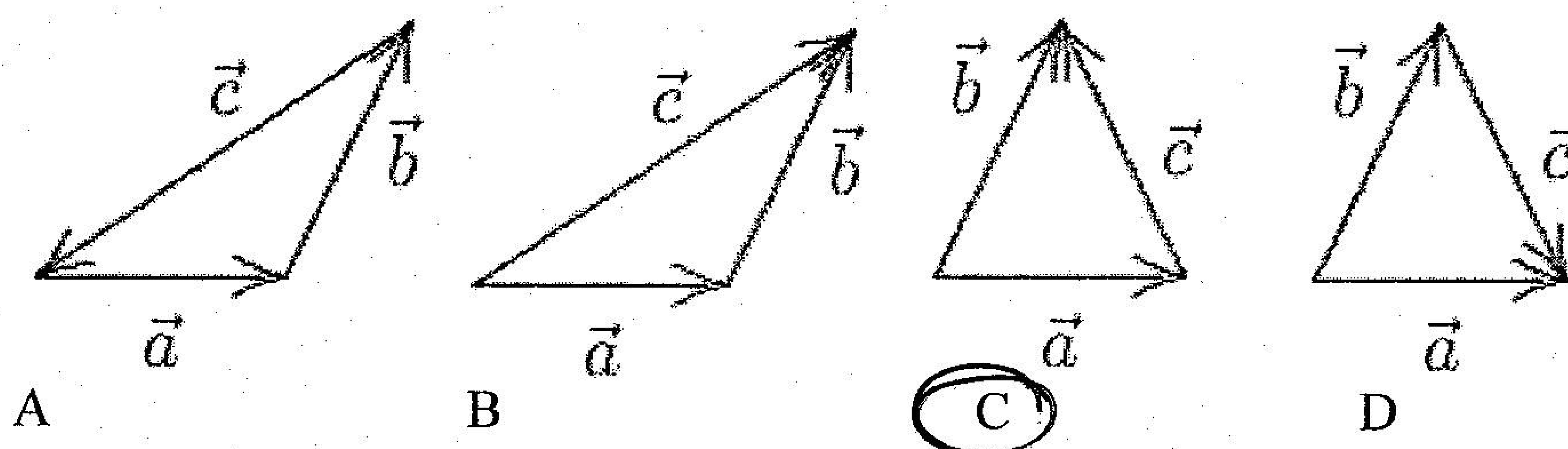


5. The diagram shows a velocity-time graph for a car moving in a straight line. At point Q the car must be:



A. moving with zero acceleration
B. traveling below ground-level.
C. traveling in the reverse direction to that at point P
D. reducing speed
E traveling downhill

6. The vectors **a**, **b**, and **c** are related by **c** = **b**-**a**. Which diagram below illustrates this relation?



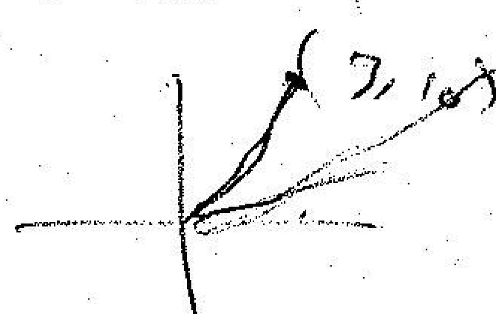
E. None of these

7. The angle between A =(-25 m) i + (45 m) j and the positive x axis is:

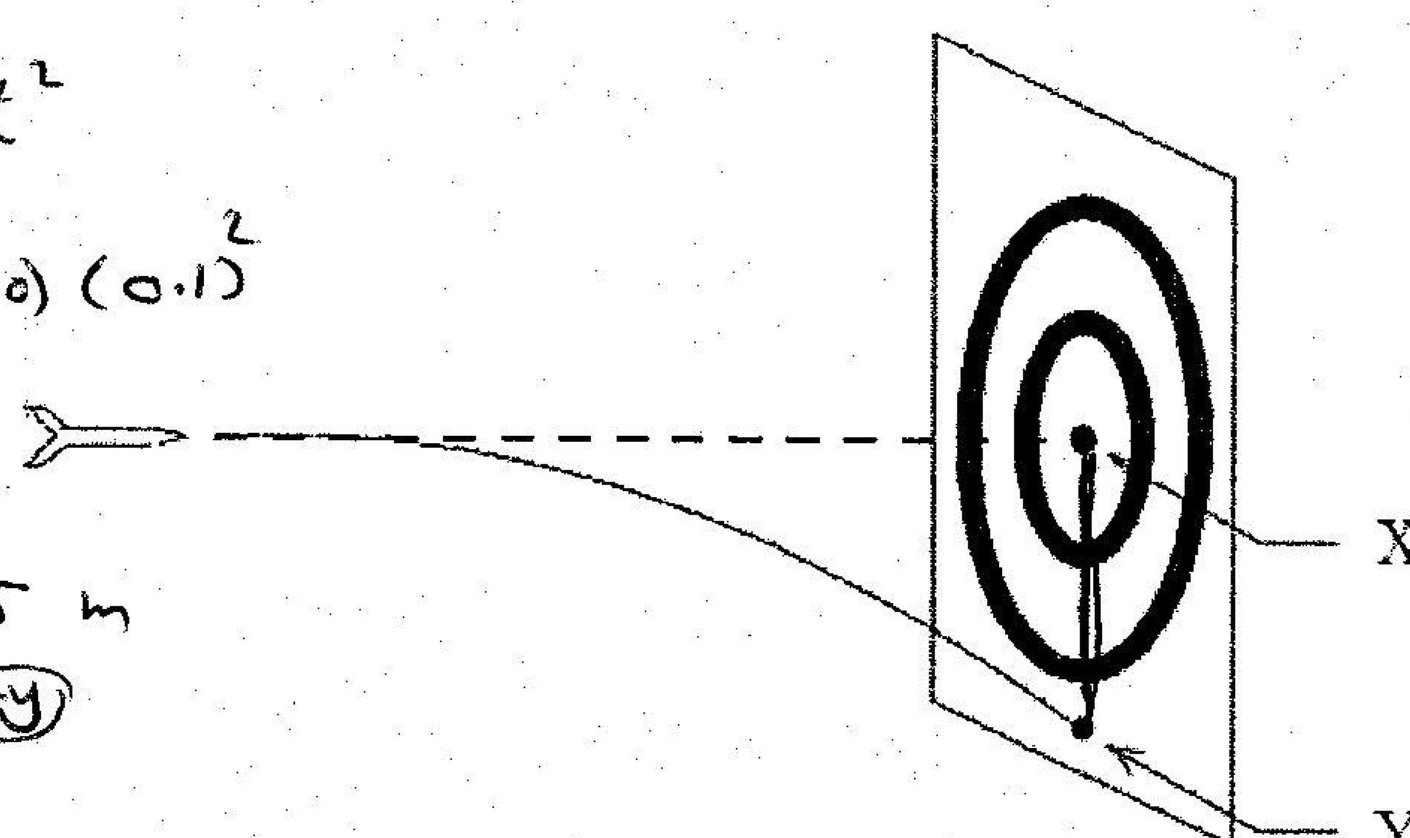
A. 151° B. 119° C. 61° D. 29° E. 209°

8. A certain vector in the xy plane has an x component of 3 m and a y component of 10 m. It is then rotated in the xy plane so its x component is doubled. Its new y component is about:

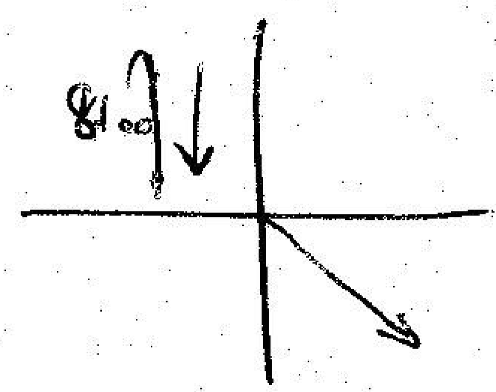
A. 20 m B. 7.2m C. 5.0m D. 4.5m E. 8.5m



9. A dart is thrown horizontally toward X at 20 m/s as shown. It hits Y 0.1 s later. The distance XY is:



A. 0.2 m B. 1 m C. 0.5m D. 0.1m E. 0.05 m



10. An airplane is flying north at 400 km/h. It makes a gradual 180° turn at constant speed, changing its direction of travel from north through east to south. The process takes 40 s. The average acceleration of the plane for this turn (in km/h·s) is:

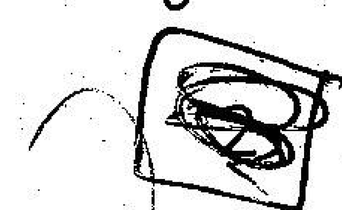
A. 10 km/h · s, north B. 10 km/h · s, east C. 20 km/h · s, south D. 20 km/h · s, north E. 25 km/h · s, south

11. For a biological sample in a 0.5 m radius centrifuge to have a centripetal acceleration of 25g its speed must be:

A. 11.2 m/s B. 16 m/s C. 50 m/s D. 122 m/s E. 245 m/s

Table 1:

1	2	3	4	5	6	7	8	9	10	11
E	D	A	C	D	C	A	E	E	C	A



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2.5

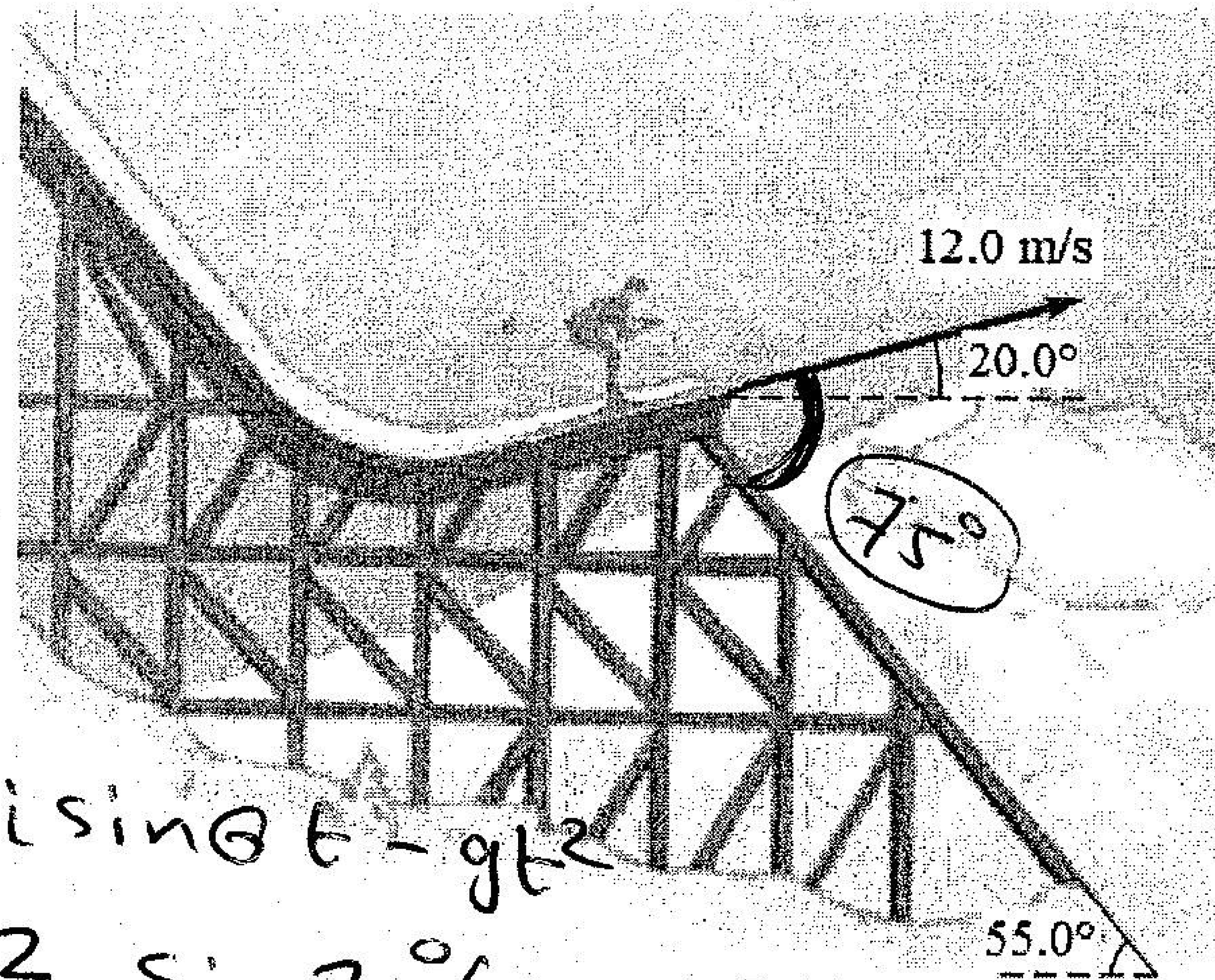
II. Solve the problem and show all your calculations

A skier leaves the ramp of a ski jump with a velocity of 12.0 m/s, 20.0° above the horizontal, as shown in the figure. The slope is inclined at 55.0°, and air resistance is negligible.

Find: **a)** The time needed the jumper to land

b) The distance from the ramp to where the jumper lands

c) The velocity components just before the landing



θ $(20° + 55°) = 75°$

(a) $y_f = V_i \sin\theta\, t - gt^2$

$y_f = 12 \sin 75°\, t - 10t^2$

$0 = 11.6t - 10t^2$

$t(11.6 - 10t) = 0$

$t = 0$ X ← neglected

$11.6 - 10t = 0$

$11.6 = 10t$

$\therefore t = \frac{11.6}{10} = \boxed{1.16\ s}$

(b) $x_f = V_i \cos\theta\, t$

$= 12 \cos 75° (1.16)$

$= \boxed{3.6\ m}$

(c) We need V_{xf}, V_{yf}

$V_{xf} = V_{xi} + at$

$V_{xf} = V_{xi} = 12 \cos 75 = 3.1\ m/s$

$V_{yf} = V_{yi} - 4.9t^2$

$= 12 \sin 75° - 4.9(1.16)^2$

$= 11.5 - 6.59$

$\vec{V} = 3.1\hat{i} + 4.91\hat{j}$

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